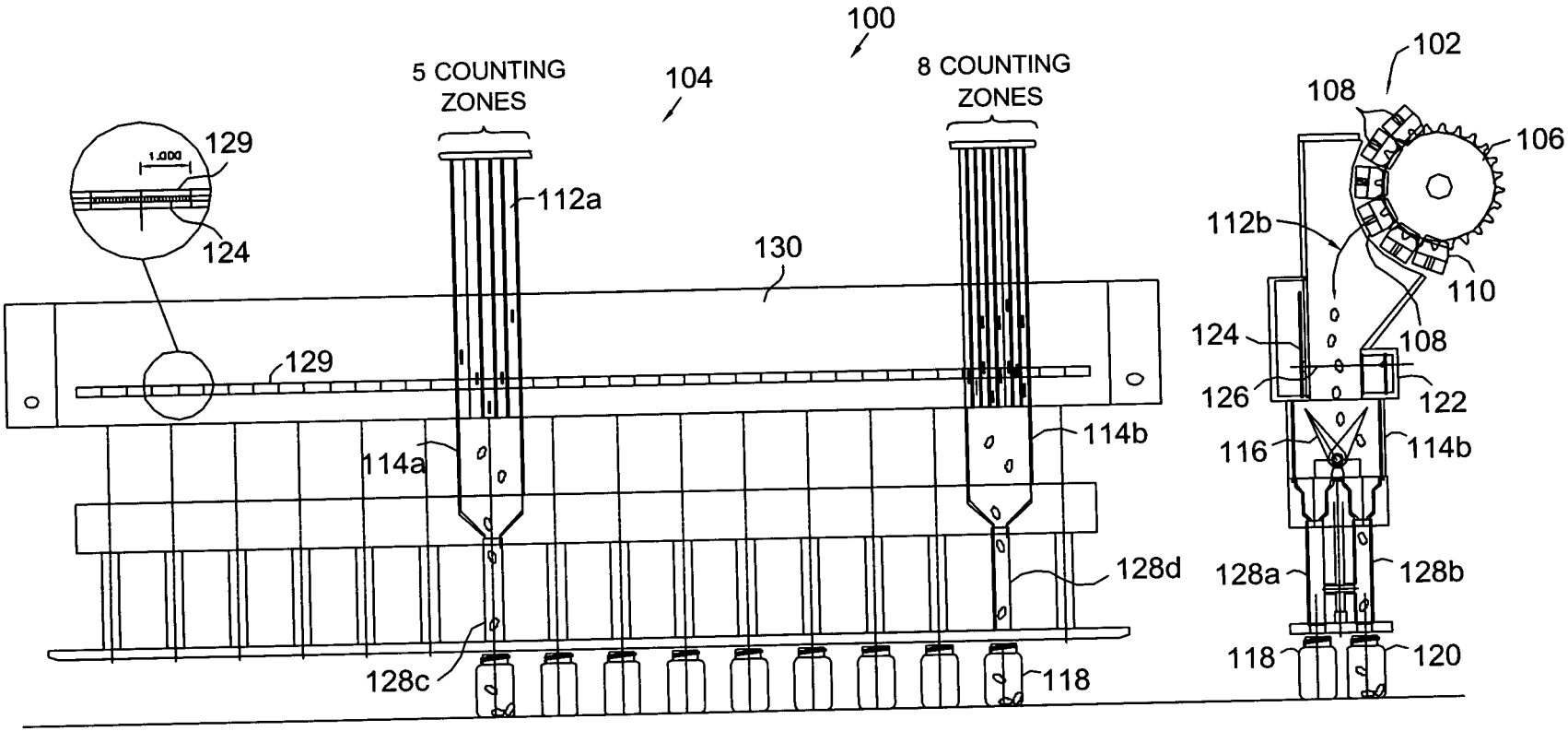
FIG. 1


100
5 COUNTING ZONES
104
8 COUNTING ZONES
102
108
106
129
112a
130
112b
110
124
108
129
124
126
122
116
114b
114a
114b
128d
128a
128b
128c
118
118
120

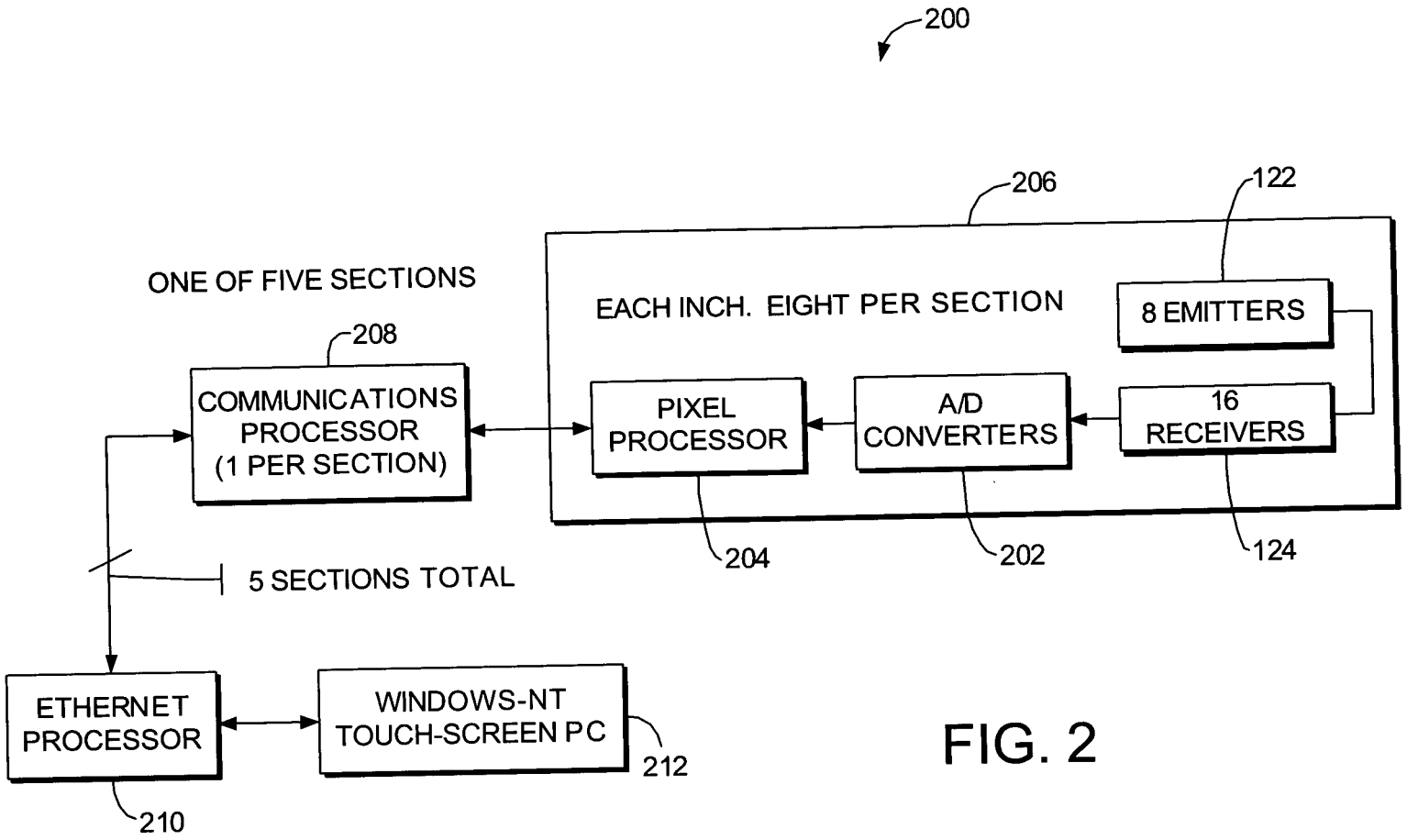

200
206
122
ONE OF FIVE SECTIONS
EACH INCH. EIGHT PER SECTION
8 EMITTERS
208
COMMUNICATIONS PROCESSOR (1 PER SECTION)
PIXEL PROCESSOR
A/D CONVERTERS
16 RECEIVERS
204
202
124
5 SECTIONS TOTAL
ETHERNET PROCESSOR
WINDOWS-NT TOUCH-SCREEN PC
212
210

FIG. 2

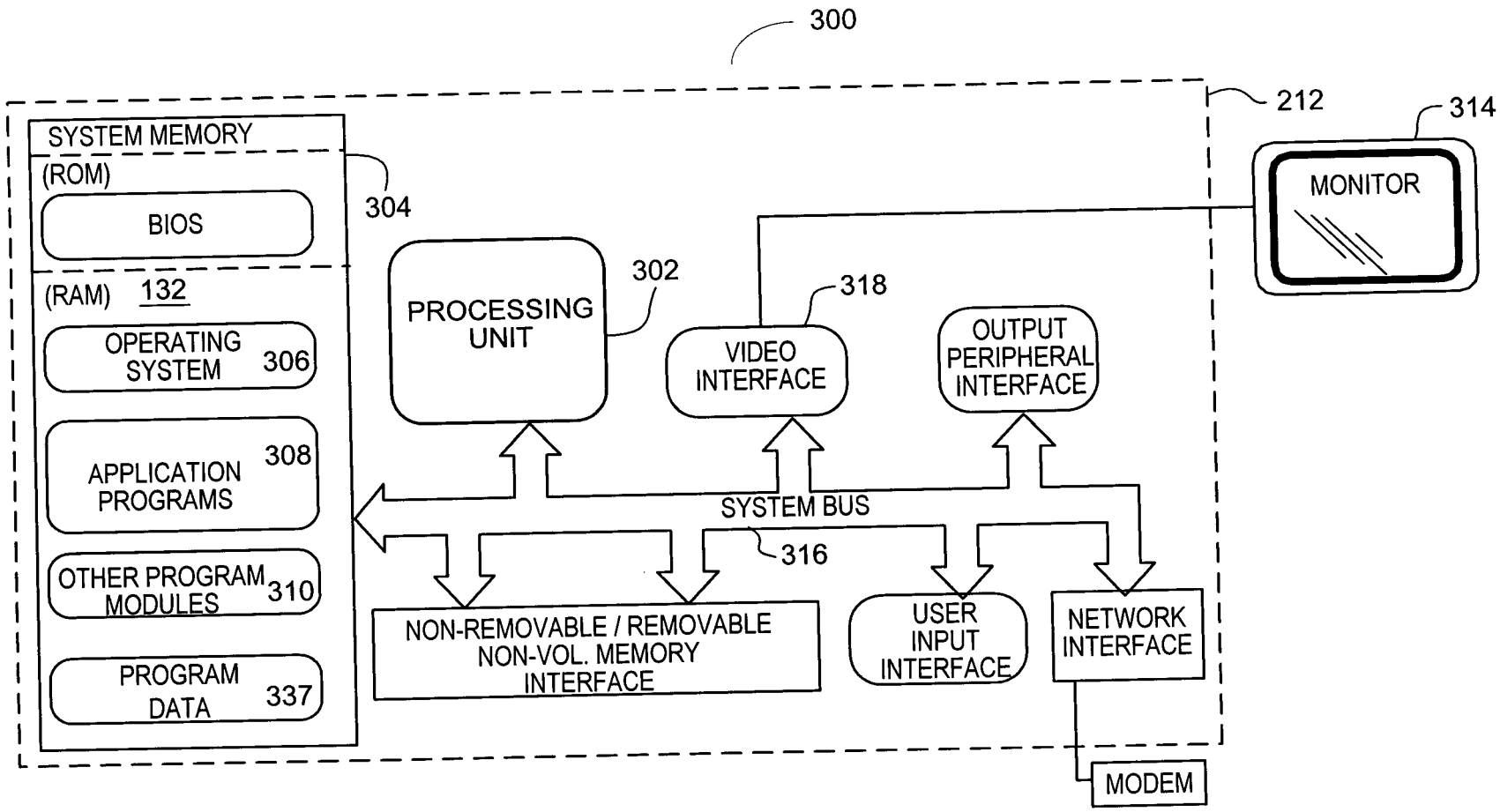

300
212
314
SYSTEM MEMORY
(ROM)
BIOS
304
(RAM) 132
OPERATING SYSTEM 306
APPLICATION PROGRAMS 308
OTHER PROGRAM MODULES 310
PROGRAM DATA 337
PROCESSING UNIT
302
VIDEO INTERFACE
318
OUTPUT PERIPHERAL INTERFACE
MONITOR
SYSTEM BUS
316
NON-REMOVABLE / REMOVABLE NON-VOL. MEMORY INTERFACE
USER INPUT INTERFACE
NETWORK INTERFACE
MODEM

FIG. 3

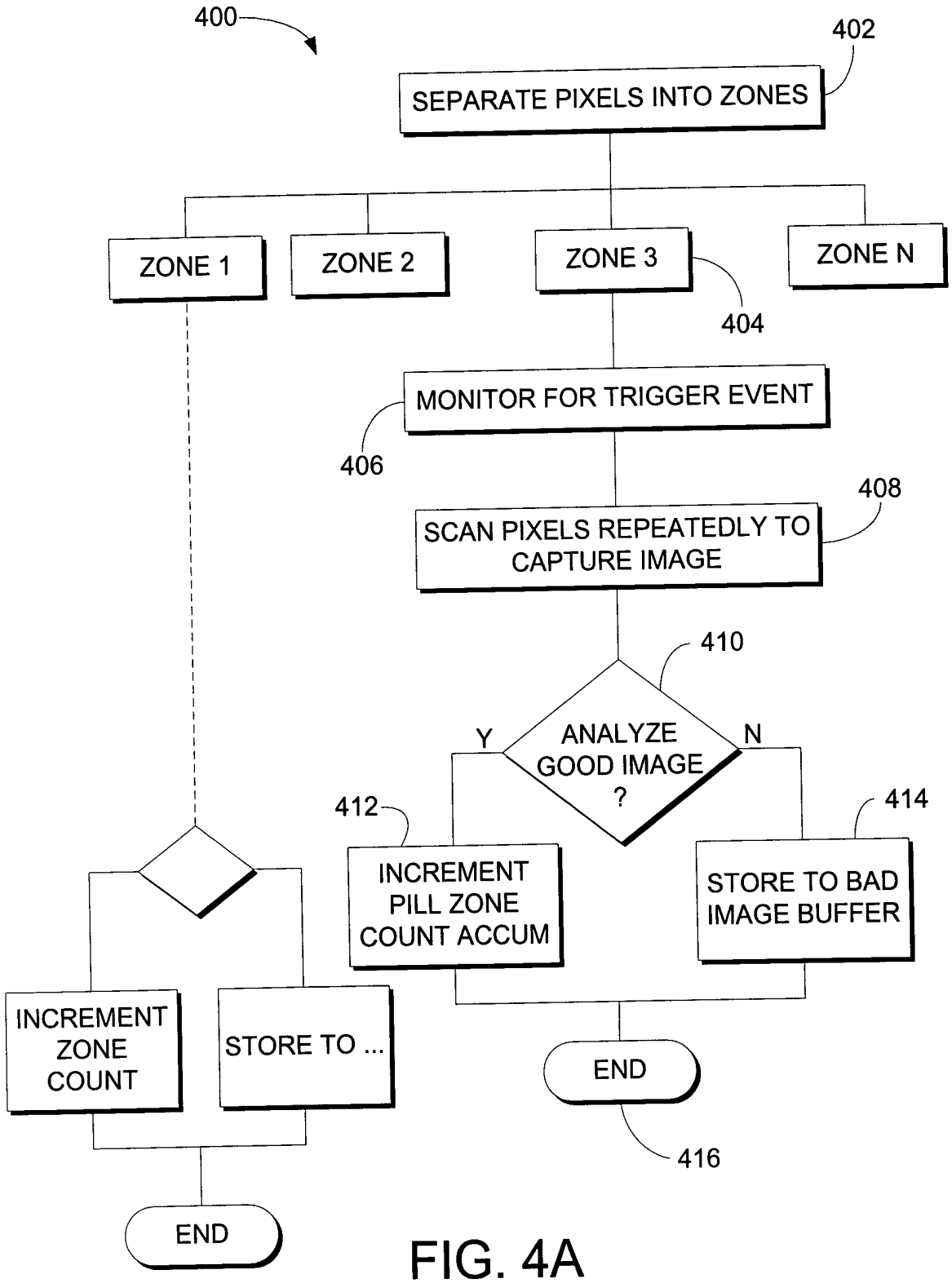

400
402
SEPARATE PIXELS INTO ZONES
ZONE 1
ZONE 2
ZONE 3
ZONE N
404
MONITOR FOR TRIGGER EVENT
406
SCAN PIXELS REPEATEDLY TO CAPTURE IMAGE
408
410
ANALYZE GOOD IMAGE ?
Y
N
412
INCREMENT PILL ZONE COUNT ACCUM
414
STORE TO BAD IMAGE BUFFER
INCREMENT ZONE COUNT
STORE TO ...
END
416
END

FIG. 4A

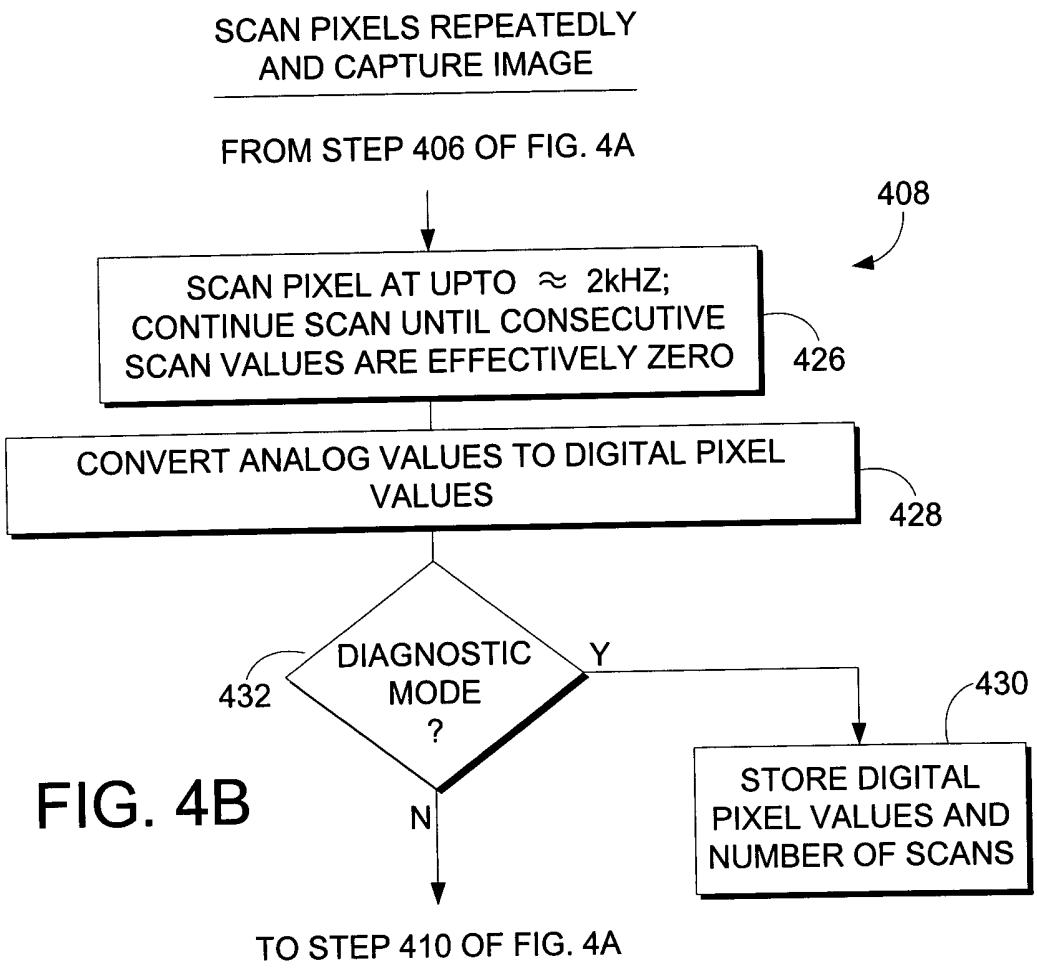

SCAN PIXELS REPEATEDLY AND CAPTURE IMAGE
FROM STEP 406 OF FIG. 4A
408
SCAN PIXEL AT UPTO ≈ 2kHZ; CONTINUE SCAN UNTIL CONSECUTIVE SCAN VALUES ARE EFFECTIVELY ZERO
426
CONVERT ANALOG VALUES TO DIGITAL PIXEL VALUES
428
DIAGNOSTIC MODE ?
432
Y
430
STORE DIGITAL PIXEL VALUES AND NUMBER OF SCANS
N
TO STEP 410 OF FIG. 4A

FIG. 4B

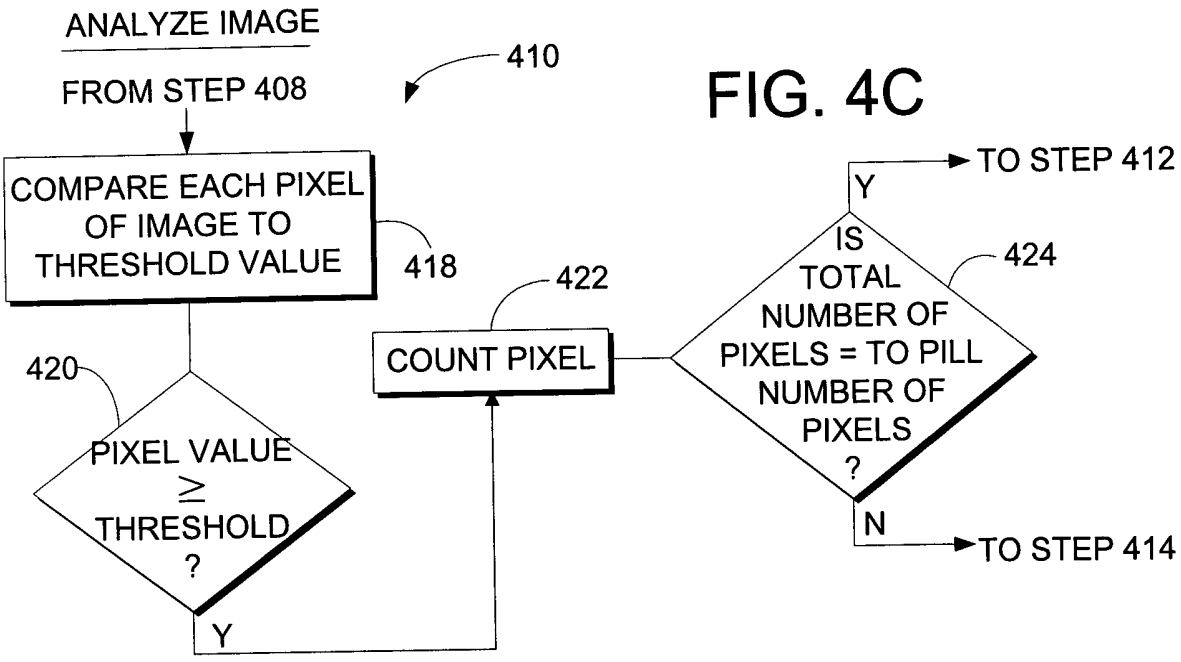

ANALYZE IMAGE
FROM STEP 408
410
COMPARE EACH PIXEL OF IMAGE TO THRESHOLD VALUE
418
420
PIXEL VALUE ≥ THRESHOLD ?
Y
422
COUNT PIXEL
IS TOTAL NUMBER OF PIXELS = TO PILL NUMBER OF PIXELS ?
424
Y
TO STEP 412
N
TO STEP 414

FIG. 4C

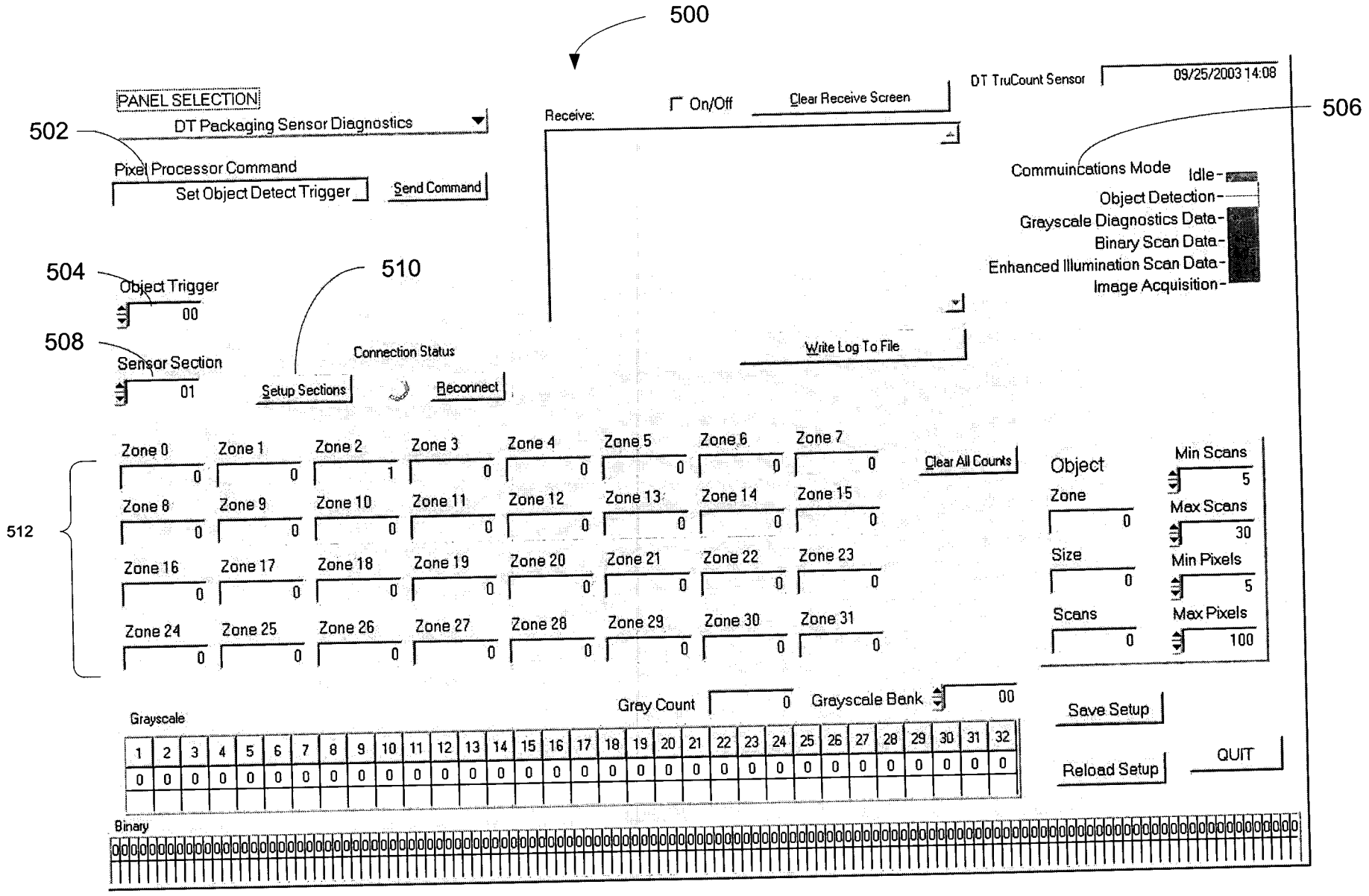

500
PANEL SELECTION
DT Packaging Sensor Diagnostics
502
Pixel Processor Command
Set Object Detect Trigger
Send Command
Receive:
On/Off
Clear Receive Screen
DT TruCount Sensor
09/25/2003 14:08
506
Communications Mode
Idle
Object Detection
Grayscale Diagnostics Data
Binary Scan Data
Enhanced Illumination Scan Data
Image Acquisition
504
Object Trigger
00
508
Sensor Section
01
510
Setup Sections
Connection Status
Reconnect
Write Log To File
512
Zone 0
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Zone 9
Zone 10
Zone 11
Zone 12
Zone 13
Zone 14
Zone 15
Zone 16
Zone 17
Zone 18
Zone 19
Zone 20
Zone 21
Zone 22
Zone 23
Zone 24
Zone 25
Zone 26
Zone 27
Zone 28
Zone 29
Zone 30
Zone 31
Clear All Counts
Object
Zone
Size
Scans
Min Scans
Max Scans
Min Pixels
Max Pixels
Gray Count
Grayscale Bank
Grayscale
Save Setup
Reload Setup
QUIT
Binary

FIG. 5

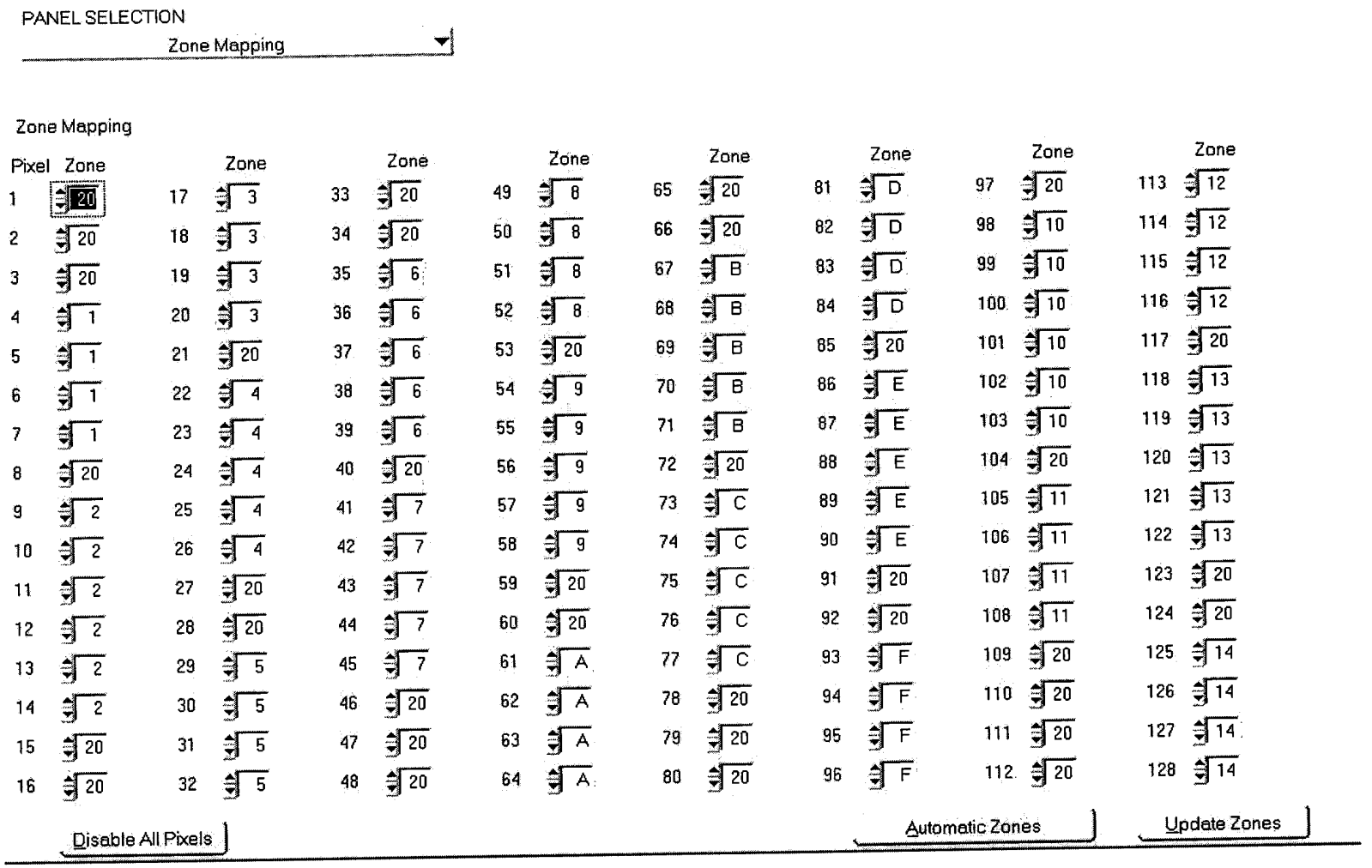

PANEL SELECTION
Zone Mapping
Zone Mapping
Pixel Zone
1 20
2 20
3 20
4 1
5 1
6 1
7 1
8 20
9 2
10 2
11 2
12 2
13 2
14 2
15 20
16 20
Zone
17 3
18 3
19 3
20 3
21 20
22 4
23 4
24 4
25 4
26 4
27 20
28 20
29 5
30 5
31 5
32 5
Zone
33 20
34 20
35 6
36 6
37 6
38 6
39 6
40 20
41 7
42 7
43 7
44 7
45 7
46 20
47 20
48 20
Zone
49 8
50 8
51 8
52 8
53 20
54 9
55 9
56 9
57 9
58 9
59 20
60 20
61 A
62 A
63 A
64 A
Zone
65 20
66 20
67 B
68 B
69 B
70 B
71 B
72 20
73 C
74 C
75 C
76 C
77 C
78 20
79 20
80 20
Zone
81 D
82 D
83 D
84 D
85 20
86 E
87 E
88 E
89 E
90 E
91 20
92 20
93 F
94 F
95 F
96 F
Zone
97 20
98 10
99 10
100 10
101 10
102 10
103 10
104 20
105 11
106 11
107 11
108 11
109 20
110 20
111 20
112 20
Zone
113 12
114 12
115 12
116 12
117 20
118 13
119 13
120 13
121 13
122 13
123 20
124 20
125 14
126 14
127 14
128 14
Disable All Pixels
Automatic Zones
Update Zones

FIG. 6A

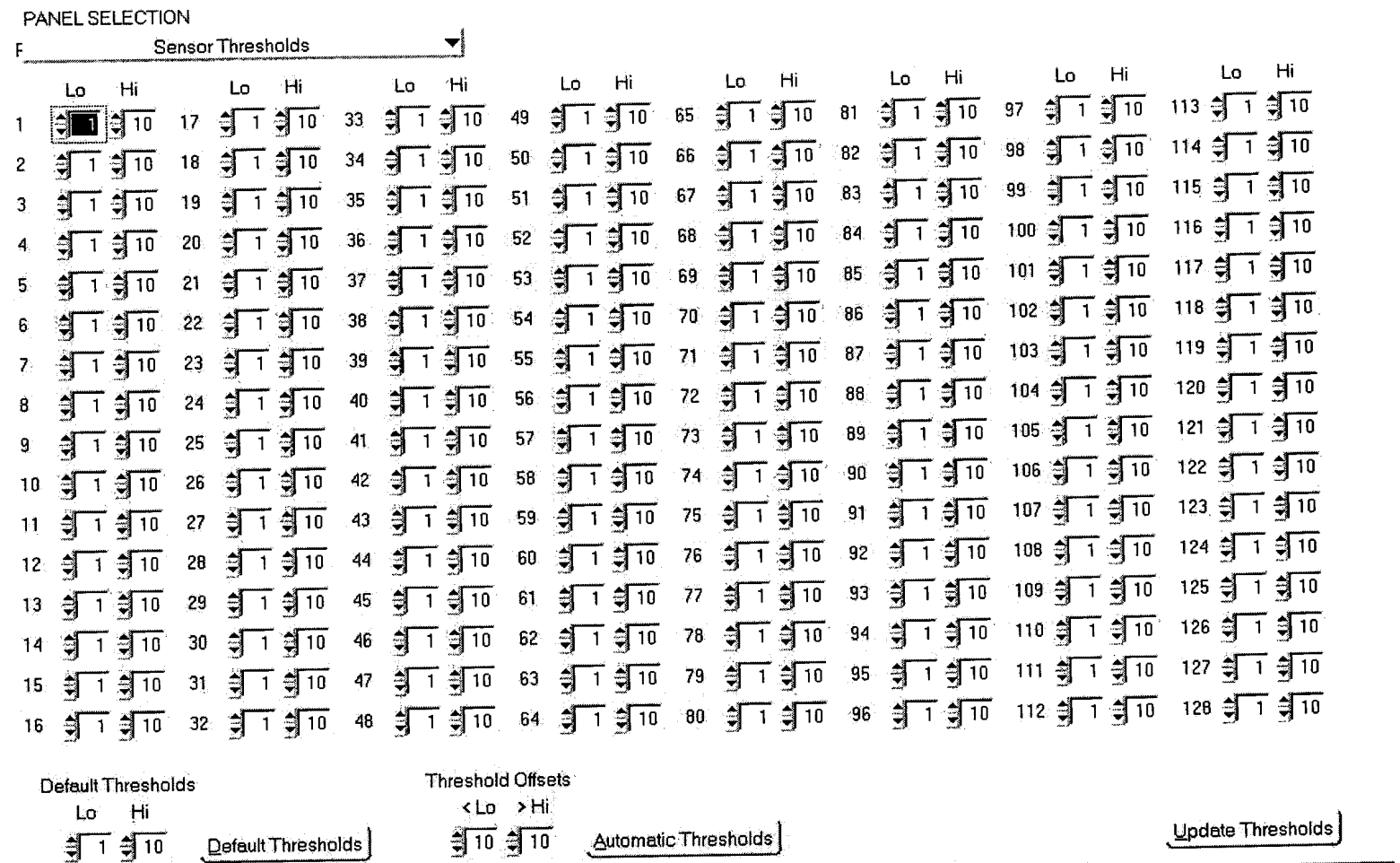

PANEL SELECTION
Sensor Thresholds
Lo Hi
1 1 10
2 1 10
3 1 10
4 1 10
5 1 10
6 1 10
7 1 10
8 1 10
9 1 10
10 1 10
11 1 10
12 1 10
13 1 10
14 1 10
15 1 10
16 1 10
17 1 10
18 1 10
19 1 10
20 1 10
21 1 10
22 1 10
23 1 10
24 1 10
25 1 10
26 1 10
27 1 10
28 1 10
29 1 10
30 1 10
31 1 10
32 1 10
33 1 10
34 1 10
35 1 10
36 1 10
37 1 10
38 1 10
39 1 10
40 1 10
41 1 10
42 1 10
43 1 10
44 1 10
45 1 10
46 1 10
47 1 10
48 1 10
49 1 10
50 1 10
51 1 10
52 1 10
53 1 10
54 1 10
55 1 10
56 1 10
57 1 10
58 1 10
59 1 10
60 1 10
61 1 10
62 1 10
63 1 10
64 1 10
65 1 10
66 1 10
67 1 10
68 1 10
69 1 10
70 1 10
71 1 10
72 1 10
73 1 10
74 1 10
75 1 10
76 1 10
77 1 10
78 1 10
79 1 10
80 1 10
81 1 10
82 1 10
83 1 10
84 1 10
85 1 10
86 1 10
87 1 10
88 1 10
89 1 10
90 1 10
91 1 10
92 1 10
93 1 10
94 1 10
95 1 10
96 1 10
97 1 10
98 1 10
99 1 10
100 1 10
101 1 10
102 1 10
103 1 10
104 1 10
105 1 10
106 1 10
107 1 10
108 1 10
109 1 10
110 1 10
111 1 10
112 1 10
113 1 10
114 1 10
115 1 10
116 1 10
117 1 10
118 1 10
119 1 10
120 1 10
121 1 10
122 1 10
123 1 10
124 1 10
125 1 10
126 1 10
127 1 10
128 1 10
Default Thresholds
Lo Hi
1 10
Default Thresholds
Threshold Offsets
< Lo > Hi
10 10
Automatic Thresholds
Update Thresholds

FIG. 6B

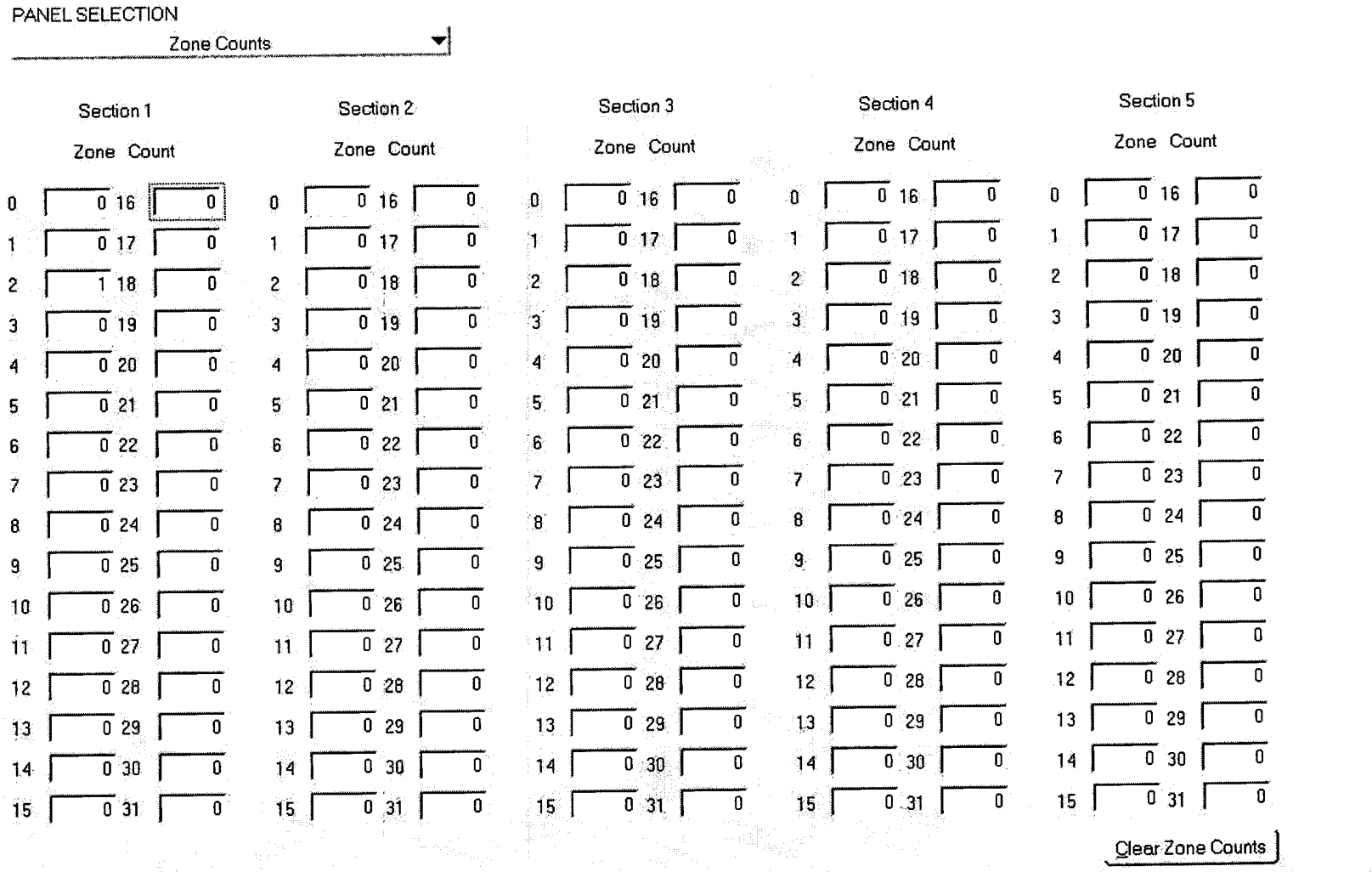

PANEL SELECTION
Zone Counts
Section 1
Zone Count
Section 2
Zone Count
Section 3
Zone Count
Section 4
Zone Count
Section 5
Zone Count
Clear Zone Counts

FIG. 6C

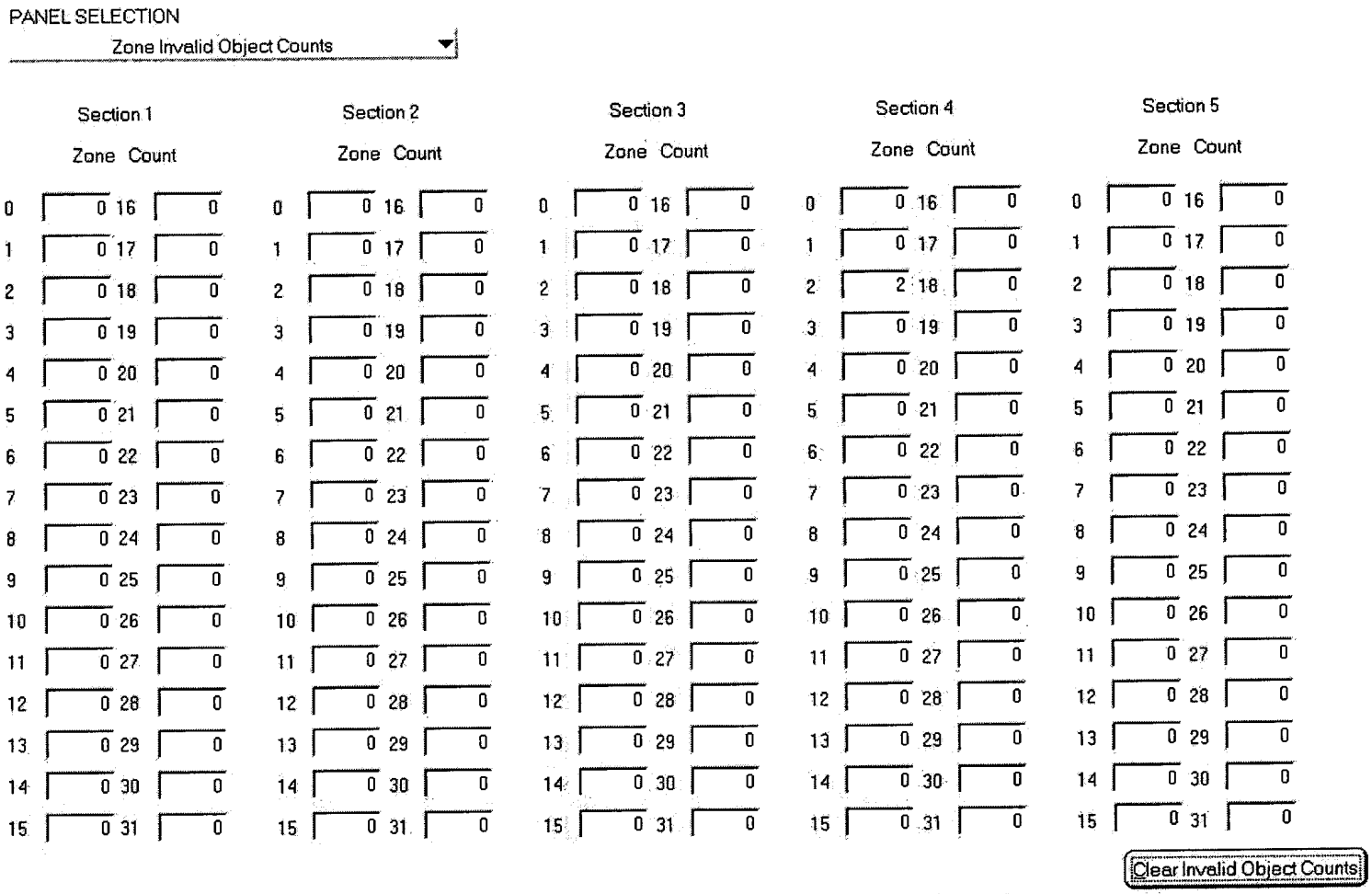
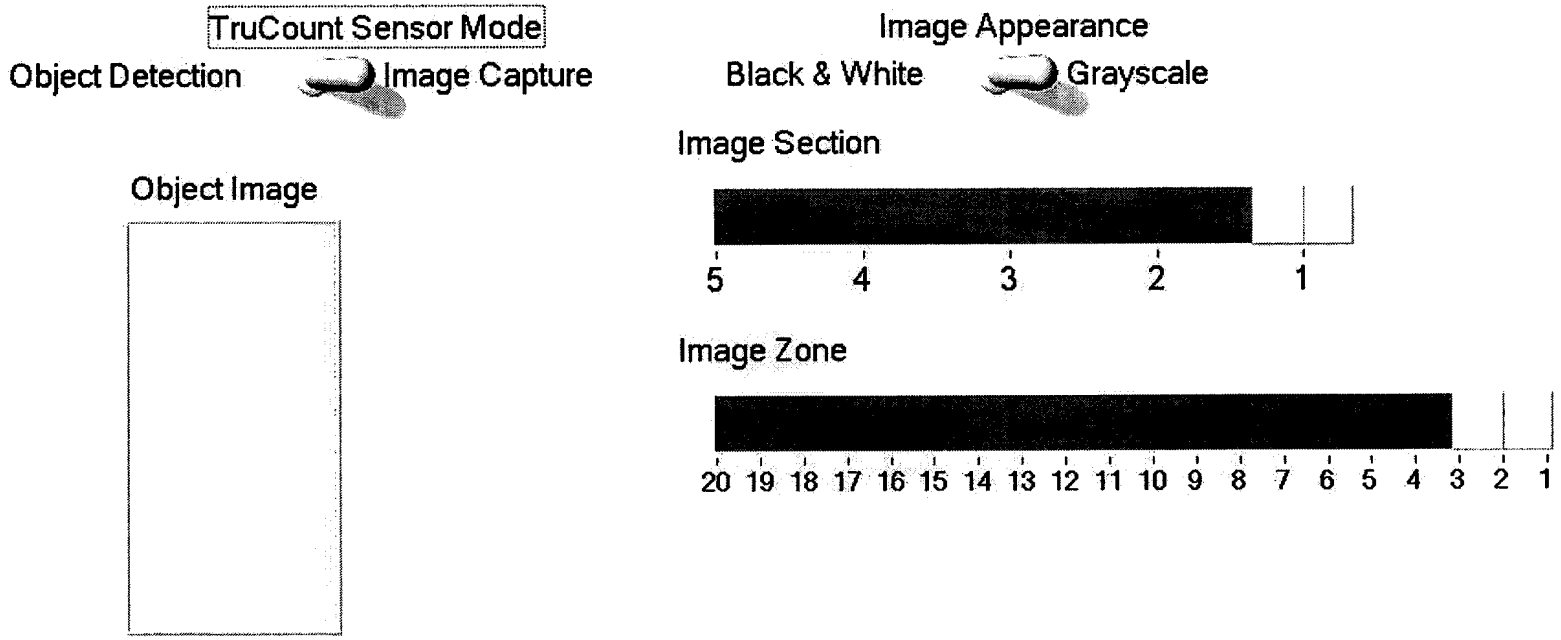

PANEL SELECTION
Zone Invalid Object Counts
Section 1
Zone Count
Section 2
Zone Count
Section 3
Zone Count
Section 4
Zone Count
Section 5
Zone Count
Clear Invalid Object Counts

FIG. 6D


TruCount Sensor Mode
Object Detection
Image Capture
Object Image
Image Appearance
Black & White
Grayscale
Image Section
5 4 3 2 1
Image Zone
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Main

FIG. 6E